

**Corporate Investment in Japan:
How Important are the Financial Factors?**

Shingo Nakazawa

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Shingo Nakazawa
Economics Department
Columbia University

sn221@columbia.edu

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Abstract

This paper tries to answer the question: how important are the financial factors in two declines of corporate investment in the 1990's in Japan? We find (1) in 1992-1994 the financial factor, specifically an increase in call rate during 1989-91, partly contributed to the decline of investment especially indirectly through the real factor, but it was not a dominant factor; and (2) in 1998-1999 credit crunch which is induced by the so-called banking crisis played a significant role in the decline of investment directly and indirectly. Eliminating this shock leads the corporate investment to positive growth from negative 7-8% growth, and (3) incorporating interaction between financial factors and real factors (financial accelerator effect) greatly increases the estimate of financial factor effect. In other words, considering only direct effect may lead to a significant underestimate of financial factor effect.

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Introduction

Throughout the 1990's, the Japanese economy experienced two recessions. First, after the burst of the bubbleⁱ, real GDP growth dropped from **4.5%** (1985-1991 average: calendar year) to **0.9%** (1992-1995). Second, after the recovery of 1996 (**5.0%**)ⁱⁱ, it declined to **-0.2%** (1997-1999 (til Q3)).

In both periods, corporate investment contributed to those declines the most among the components of GDP. In the 1992-94 period, the contribution of corporate investment to real GDP growth rate was **-1.3%** (1992-1995 average). Also in 1998-99, it was **-1.2%** (Table 1).

It is extremely important to know the causes which induced these declines of corporate investment to understand the Japanese economy in the 1990's. Although various candidates of causes have been proposed, we may be able to classify them in three rough categories.

(1) Business Conditions (investment opportunity) storyⁱⁱⁱ.

Corporate investment drops because there is little investment opportunity. This explanation is based on traditional neoclassical investment theory in which shadow value of additional unit of capital, the so-called **Tobin's marginal q** determines the level of capital stock (investment). Along a similar line, one can argue that active investment in the bubble era^{iv} led to **excess capital stock** after the bubble, which decreased the investment in 90's as the adjustment process to the optimal level of capital stock^v.

(2) Asymmetric information story (borrower's balance sheet effect)

Recently it has been widely perceived that there is informational asymmetry in capital market in the sense that suppliers of funds do not know all the information about

the borrowers' (firms') projects. This causes well-known “**adverse selection**” and “**moral hazard**” problem^{vi}. Combined with a limited liability of borrowers (in the case of bankruptcy “suppliers” may not recover their loan in full), the supply of funds becomes less than the optimal level. In order to solve this problem, say, banking sector, which is typical supplier of external funds in Japan, takes assets(land, stock etc.) of borrowers as collateral. Since the collateral value declined after the bubble period, this asymmetric information problem was exacerbated, hence lending and investment declined. Therefore the balance sheet of borrowers matters.

Note that this story assumes that the behavior of the lender side is fixed. That is, without the deterioration of the financial condition of supply side explained below, the deterioration of borrower's balance sheet itself can lower the lending and investment.

(3) Credit Crunch story (lender's balance sheet effect)

Contrary to (2), this story focuses on lenders' balance sheets, especially those of the banking sector. The decline of asset price through the increase of non-performing loan yields **shortage of equity capital** of banking sector, which induces them to reduce asset (=loan) in order to maintain the ratio of equity to asset, hence investment declines. Combined with BIS capital regulation^{vii}, this view attracts considerable attention especially in the decline of investment during 1998-99^{viii}. In addition to this **capital crunch** effect, especially after November 1997 the situation so-called ‘**financial system shock**^{ix}’ have emerged. We conceptually think of all of those changes in lender's attitude as **credit crunch** effect.

We could also explain the decline of investment by a different perspective: “**macroeconomic policy**”. Fiscal policy works mainly through (1) raising the investment opportunities. Monetary policy may work through all of them, increasing the profitable project ((1)), raising land and stock prices ((2)) and recovering bank balance sheet by increasing profit of banking sector ((3)) by lowering interest rate. In a sense they are a more fundamental cause than (1)-(3).

Note that (1) and (2) are about the borrower’s side of the credit market while (3) concerns the lender’s side. We can also classify them by **real factor**((1)) and **financial factors**((2)&(3)). Of course these two factors are mutually correlated and may cause a vicious cycle, specifically the deterioration of balance sheet of either borrower or lender reduce investment at first place, and depress economy that, in turn, hurt the balance sheet of both sides again. This role of financial factor is called ‘**financial accelerator**’ in the literature^x.

A lot of empirical researches have been done about the asymmetric information on investment decision. For example, Fazzari, Hubbard and Perterson (1988), Hoshi, Kasyhap and Scharfstein (1991), using firm-level data, emphasized the importance of this information problem for low dividend payout firms (US), non-Keiretsu firms (Japan), respectively. Sekine (1999) also claimed the credit crunch story is significant for non-Keiretsu firms in recent Japan. Using the aggregate data, Yoshikawa and Motonishi (1999), Ogawa and Kitasaka (2000) showed that especially small firms suffer from financial distress, and this effect can explain the significant portion of GDP decline in recent Japan.

The purpose of this paper is to explore the role of the financial factor in recent downturns in Japan and to know how important it is in the aggregate sense.

This paper is different from those two existing papers (Yoshikawa and Motonishi (1999), Ogawa and Kitasaka (2000)) which focused on aggregate effect of financial factor in many respects. We connect the financial factor with the traditional q -theory of investment with asymmetric information and credit crunch. Then we not only emphasize the importance of financial variable in the aggregate but also show that there were actually financial shocks, which lead the investment to the recent decline. We also show that the more financially distressed industries are less responsive to real shocks, which is consistent with the theory.

Section 2 explains standard q -theory of investment incorporating the effects explained above and derive the equation to be estimated. Section 3 summarizes previous empirical results in the literature of this area and states the problems related to the estimation or the data they used. Section 4 explains the data and specification of estimating the equation we use and claim the validity of our specification and variables. Section 5 gives estimation results and computes aggregate effect of financial factor. The results obtained are compared with the other analysis of this area. Also preliminary analysis shows importance of ‘financial accelerator effect’. Section 6 concludes.

2. Theory of Investment

2.1 q -approach

Here we derive an explicit form of investment equation, into which we can incorporate the factors explained above as an explanatory variable. Assuming convex

costs of adjusting the capital stock, $C(I, K)$, representative firm are supposed to maximize the expected present discounted value of net cash flow, ie,

$$E_t \left\{ \sum_{s=t}^{\infty} b^s [p(K_s) - C(I_s, K_s) - p_s I_s] \right\} \text{-----} (1)$$

subject to the capital accumulation constraint:

$$K_s = (1 - d_s) K_{s-1} + I_s$$

for all s . E_t stands for expectations operator using information available at time t , b is discount rate, “ p_i ” is the usual profit function, K is capital stock at the beginning of time t , I is investment, p is relative price of capital goods and “ δ ” is depreciation rate. First-order condition with respect to investment yields

$$p_t + C_I(I_t, K_t) = q_t \text{-----} (2)$$

where q is the present discounted value of the increase in profit by new investment. This is also known as **Tobin’s marginal q** (q :henceforth). Following Hayashi (1982) we assume the particular form of adjustment cost (such that marginal adjustment cost with respect to investment is linear in I/K) below

$$C(I_t, K_t) = \left(\frac{a}{2} \right) \left[\frac{I_t}{K_t} - a \right]^2 K_t$$

Then we get explicit form of investment equation

$$\left(\frac{I}{K} \right)_t = a + \frac{1}{a} [q_t - p_t] \text{-----} (3)$$

Note that this marginal q is not observable. Under the assumptions made by Hayashi (1982) (homogenous capital goods, homogenous of degree one production function and adjustment cost function and efficient stock market), we can use **average q (Q , henceforth)** which is observed in financial market^{xi} instead of marginal q (minus p with the assumption of perfect competition in factor and product market). Hence (3) can be written with the error term e as

$$\left(\frac{I}{K} \right)_t = a + bQ_t + e_t \text{ ----- (4)}$$

This is the basic equation which has been widely estimated in the literature of this area under the assumption of a perfect capital market.

2.2 Violation of frictionless capital market

We assumed above that the firm can finance from a perfect capital market. In other words, the firm can invest all projects which yield more than market interest rate (Figure 1-a). More realistically we incorporate asymmetry of information about the project the firm invests (the firm knows more about the project than the investor does). This asymmetry of information, which could arise in various forms such as the choice and use of capital, investment opportunities, riskiness of projects and so on, can lead to adverse selection and/or moral hazard. For example, following Myers and Majluf (1984), if managers of the firm are better informed than investors about the firm's prospects and are assumed to act in the interest of old shareholders, and investors correctly know the conflict of interests between them, then the rational investor would require premium on an uncollateralized portion of the projects. That is, the supply curve of the capital market

has two parts: horizontal part at interest rate r (collateralized part: up to the level of net worth) and upward sloping part (uncollateralized part). There is a kink at the quantity of collateralized asset, or net worth^{xii}(Figure 1-b). Other explanations of asymmetric information have similar consequences about the cost of funds.

We can think of two types of firms. The demand curve for capital stock which is downward-sloping crosses the supply curve at either (1) horizontal part or (2) upward-sloping part. If (1), we call this type of firms as “**Unconstrained firm**”, a small decrease of net worth (collateralized asset) (leftward shift of supply curve) does not change the level of capital stock (Figure 1-c). We call (2) as “**Constrained firm**” since the depress of net worth decreases the capital stock(from K_c to K_c') and increase the required rate of return.

To investigate this effect of the change in net worth on investment, many studies have used the modified specification of (4)

$$\left(\frac{I}{K} \right)_t = a + bQ_t + c \left(\frac{CF}{pK} \right)_t + e_t \text{----- (4)'}$$

where CF is the cash flow as a proxy for the change in net worth.

Note that a shift in the demand curve in Figure 1-d is captured by Q . By controlling the demand curve we can estimate the role of net worth. Figure 1-d implies that estimated ‘ b ’ in (4)’ for the constrained firms should be smaller than for the unconstrained firms precisely because they are constrained by the upward-sloping parts of supply curve. Also ‘ c ’ in (4)’ should be significantly larger than zero for constrained firms while it should be zero for unconstrained firms.(Figure 1-c)

2.3 Credit Crunch

In addition to the asymmetric information problem (balance sheet problem of borrowers) described above, we are interested in the effect of the credit crunch of banking sector to investment (balance sheet problem of lenders).

When the equity capital is damaged as in the situation of Japan in the 90's, the banking sector, in trying to recover the equity capital ratio, may cut lending^{xiii}. This can be represented by the shift of supply curve in credit market. It may be natural to think that the slope of the upward-sloping part of the supply curve goes up (Figure 1-e).

In the framework using (4)', we can think this effect as follows. Credit crunch does not change the level of capital stock of unconstrained firm given investment opportunity (demand curve), and net worth fixed. Hence the coefficients of those two effects are the same when there is capital crunch and otherwise. On the other hand, for the constrained firm, those coefficients are different in two situations. 'b' the effect of Q gets smaller with capital crunch, and 'c' the effect of net worth gets larger, than the case without capital crunch.

Alternatively, we could use the variable (call it as $BANK$) which stands for the financial situation of the bank's balance sheet. We can estimate

$$\left(\frac{I}{K} \right)_t = a + bQ_t + c \left(\frac{CF}{pK} \right)_t + dBANK_t + e_t \text{-----} (4)''$$

where $BANK$ can be capital-asset ratio, (inverse of) non-performing ratio or credit rating of the bank lends to the firm.

3. Problems in estimation

Although we get the explicit specification like (4)' or (4)'', we still have some problems in estimation for our purpose, which is to know the aggregate effect of financial factors on investment.

Suppose we have aggregate (macro-level) data. Our data set consists of (I/K) , Q which depends on the stock price, (CF/pK) and $BANK$. Since all of the explanatory variables as well as (I/K) are presumably procyclical, it may be very difficult to get robust estimated coefficients. In other words, time-series variation may not be enough to identify those effects separately in which we are interested^{xiv}. It means that we need another variation in the data.

For this reason, previous literature in this area has focused on cross-sectional (or panel) micro data hoping that cross sectional variation(in addition to the time-series variation) can solve the identification problem above.

There is a lot of literature which focuses on the role of net worth and bank's financial condition by estimating (4)' or (4)'' using micro firm-level data. Since their purpose is to test the existence of financial effect ((2), (3)), they split the entire sample into constrained firms and unconstrained firms by *a priori* criterion^{xv}, and estimate (4)' or (4)'' separately. Using Japanese data, Hoshi, Kashyap and Scharfstein (1991), Sekine (1999) and others estimate (4)' and find significantly larger estimated coefficient of CF for the constrained group than for unconstrained group, which is predicted in Section 2^{xvi}. Sekine (1999) also estimate (4)'' and find significant estimated coefficient of $BANK$ for the constrained group, but not for unconstrained group, which is also predicted by the theory in Section 2^{xvii}.

As a whole, literature in this area concludes that at least *some* firms face capital market imperfection but its effect on the aggregate investment is uncertain. Also they conclude there is a credit crunch effect for *some* firms for *some* periods in recent Japan, but its aggregate role is also unclear.

Still those approaches employed in the literature using firm-level micro data also have some problems, especially for our purpose. First of all, it has been widely perceived that Q may not be measured correctly to capture the investment opportunity of the firm. This measurement error could arise if one of Hayashi's assumptions (which ensures the equality of q and Q) is violated. One could argue that the stock market is not efficient, i.e., it may contain bubble^{xviii}, or capital goods market is not homogenous. Then Q is not a good proxy for marginal q and does not capture the investment opportunity anymore. Second, under the first problem of measurement error of Q , CF (cash flow, or the variable which stands for firm's balance sheet) may contain information about the investment opportunity which should be fully captured by Q . In this case the estimated coefficient of CF could be significantly positive even if CF has actually no effect on investment^{xix}. Therefore we may not know the effect of financial factor correctly. Third, Q may change as *BANK* moves, that is, the stock price of the firm may decline when the firm's main bank faces a serious financial situation. But this decline of the firm's stock price should be classified as financial factor, not real factor or the investment opportunity. Again we face the contamination of real and financial factors. Finally, usual micro data does not include the information about small firms. Even if they do, Q maybe hard to obtain for small firms. In addition to the small firm problem, non-manufacturing firm-level data seems to have some problem. When estimating (4)' using non-

manufacturing firm-level data, Sekine (1999) reports that “preliminary estimates [using non-manufacturing firm data] did not reveal any sensible results probably because of heterogeneity of the sample”. Because the investment share of the small firms as well as non-manufacturing firms in Japan is large^{xx} and the response of them to financial factor could be significantly different from that of the large (manufacturing) firms, we may not know the role of each factor in the aggregate sense.

We try to solve these problems using different sets of variables as proxies for real and financial factors. For this advantage, we give up the distinction between both balance sheet effects^{xxi}.

4. Data and Specification

4.1 Data

In this section, we explain the data and the specification of the estimated equation, and discuss the validity of them.

We use the investment data by industry (‘Capital stock statistics of private corporations’ by Economic Planning Agency) and diffusion indices (DI’s) by industry (in *the Short-term Economic Survey of Enterprises in Japan (Tankan)* by Bank of Japan) so that we can avoid some serious problems in estimation pointed out in Section 3. First, by using the data by industry, we can exploit the cross-sectional variation, and may mitigate the identification problem when using aggregate data. Second, using DI’s may make us differentiate the financial factor from real factor (discussed below in detail), unlike using Q , CF and $BANK$. Finally we can obtain aggregate results since our data conceptually contain all sizes of firms. For this advantage, we give up the identification of credit

crunch from net worth effect, equivalently lenders' balance sheets from borrowers' balance sheets.

The EPA data has quarterly series of investment and capital stock by industry. The Diffusion Index in the survey by Bank of Japan is frequently cited statistics by many macro economists in Japan as well as by the Japanese government. This survey asks firms questions about its current and predicted future situation, such as 'business condition', and the firms are asked to answer in 3 choices. 'Favorable', 'Not so favorable' or 'Unfavorable'(in case of 'business condition'). For example if 20% of firms answer 'favorable' and 50% answer 'unfavorable'(remaining 30% answer 'Not so favorable'), then BC at that point is minus 30(=20-50). This is done in quarterly basis, and available by industry.

DI's we will focus on are (1) "Forecast on the next quarter's business condition DI"(BC henceforth) which equals 'favorable' minus 'unfavorable' and (2) "Lending attitude of financial institutions DI"(FA) which equals 'accommodative' minus 'severe'. We will use BC as a proxy for the real factor and FA for the financial factor. We also use (3) "Production Capacity DI" (KDI) which equals 'excessive' minus 'shortage' of capital stock as a supplement for BC since this is available only for manufacture for whole sample period. Appendix I gives precise information about them.

Data used in our analysis starts at the 1st quarter of 1976 and ends at the 3rd quarter of 1999^{xxii}. Since we have seven industries and 95 quarters, we can use at most 665 observations in our estimation. Sample statistics are given in Table 2 and figures of those variables are given in Figure 2-a,b,c,d^{xxiii}^{xxiv}.

It may be useful to note some of the characteristics of the data. For example, as for the construction industry, I/K has a larger variation than other industries (standard deviation : 0.78), probably because BC fluctuates a lot (sd : 23.8). We can also make sure of the fact in figures. Also it is interesting to note that only this industry has declining I/K throughout the 90's probably because BC of construction did not recover in 1994-96. The real estate industry has a similar tendency with construction. I/K in 1999 becomes less than half of 1990. This is probably because FA and BC falls substantially in the 1990's from the bubble period. Other industries have similar (I/K)'s.

Although both FA and BC are more or less procyclical, they don't seem coincide with each other. For example in 1986 when a short period recession occurs due to a sudden appreciation of the yen, BC (especially of manufacture) drops significantly while FA stays its high level. It is good news for our purpose of identification of real and financial factors.

Except FA until early 80's, as a whole, we have a lot of variation of FA and BC across industries (cross-sectional variation). Also we have huge time-series variation through the sample period. This is also good news for our purpose.

4.2 Specification and Validity of DI's as proxies

Let's go back to equation (4)'. Remember that Q is used on behalf of unobservable marginal q , which stands for the investment opportunity. Actual Q , however, as pointed out in Section 3, may contain the information about the lender's financial situation (*BANK*) that makes it difficult to distinguish real factor from financial factor. Moreover Q is poor proxy for marginal q if the assumption used when we equate them are violated.

We use BC instead of Q by industry, because BC(future business condition) can be thought of a good proxy for investment opportunity while it does not seem to be affected by financial factor. Also we use FA(financial attitude) as a financial factor, i.e., the net worth effect plus banks' financial condition. In other words, we assume FA represents the supply curve shifter in Figure 2. Therefore we estimate the following equation.

$$\left(\frac{I}{K} \right)_{t,i} = \sum_{j=1}^l \left(a_j * \left(\frac{I}{K} \right)_{t-j} \right) + b * BC_{t,i} + c * FA_{t,i} + e_t - - - - (5)$$

where t,i denotes time, industry respectively. (I/K) series are seasonally adjusted by industry. Length of lag l is determined so that no serial correlation exists in the error term. There are some reasons why we employ this specification and why we believe they are good proxies for each factor.

Specification

One may wonder if the DI which is defined as the difference of the percentage between two answers, is valid proxy or not. Suppose the manager of the firm knows marginal q or investment opportunity of her own firm. Also suppose they answer the question about the future business condition (BC) using her information about marginal q , that is, there is a certain value of marginal q such that firms with higher marginal q than this value answer 'favorable' to the question (same for 'unfavorable'). Under further conditions (firms are uniformly distributed along marginal q , etc) discussed in Appendix II, linear specification of BC can be justified. Similar can be said about FA though we may have some problem for this. See Appendix II for details.

Validity of BC

First, BC has high negative correlation with KDI (correlation coefficient is -0.85), which is conceptually a better indicator for q than BC because KDI directly asks the question related to optimal capital stock. (See the appendix I for details.) The fact that they are highly correlated supports BC as a proxy for q . Second, Ogawa and Kitasaka (2000) actually construct marginal q (not average Q) series by manufacture/non-manufacture and large/medium/small group of firms^{xxv}. It turns out that BC here has similar characteristics with those marginal q series (they have peak in 1979, 1989 and fall sharply in 1991-1994, etc.).

Validity of FA

First, the movement of FA seems to express the movement of the balance sheet effect of both (lender's and borrower's) sides well. We expect that both the firm's balance sheet effects and the bank's balance sheet effect by industry should move similarly across industry, because the difference in business condition across industry should not be included in both effects. FA's are actually moving very similarly except for the real estate industry^{xxvi}. Second, time series movement of FA's are plausible for both balance sheet effects. The low level of FA before 1975 and in 1980 is clearly due to tightening of monetary policy^{xxvii}. The decline in 1991 seems to reflect the fall of land price as well as monetary tightening^{xxviii}. The decline in 1998 seems to reflect the banking crisis that started in November 1997. As was argued in the Introduction, monetary policy affects both balance sheets.

5. Results

Here we estimate the equation offered in the previous section, and investigate the role financial factors played. Subsection 5.1 shows the basic estimation results and the variants of it which support the robustness of the basic estimation. Our estimation results show the significance and correct sign of the financial factors. In 5.2 we test the implication of the theory explained in Section 2, that is, the more financially constrained the industry is, the less responsive to real shocks. Our result is consistent with the theory. Then in 5.3, comparing existing studies, aggregate effects of financial factors are calculated using the result obtained in 5.1, which is shown to be large, but not dominant in both periods of decline. Subsection 5.4, however, points out several problems in this aggregate effect analyses, emphasizing the importance of ‘financial accelerator effect’, and analyzes if there are shocks to financial factors and relates them to monetary policy. In 5.5 we claim that if we incorporate the interaction between financial factor and real factor, and consider appropriate shocks to financial factors, the effect of financial factors is dominant in recent declines of investment. Also this shock to financial factor in recent period is unrelated to monetary policy, implying that credit crunch induced by banking crisis is the dominant reason for recent decline of investment.

5.1 Estimation of equation and robustness

Estimation results of equation (5) are given in Table 3-a. [1] gives the results by fixed effect estimation (same hereafter)^{xxix} using the data during 1st quarter of 1976 and 3rd quarter of 1999 with l (length of the lagged dependent variable) equal to four^{xxx}. Both BC and FA have significant positive coefficients. In order to know the magnitude of the

estimated coefficient, simple rough calculation may be helpful. Say, FA rises by 10 points (see Figure 2-c for this magnitude). Then (I/K) increases by 0.018. Since the value of $I/K(*100:\text{total})$ in 1999 3rd quarter is 1.76, given K constant, investment increases by about 1.1% (annual rate). If we consider lagged dependent variable, since the sum of their coefficients is 0.85 (see the footnote of Table 3-a), the cumulative effect will be approximately 2.0% (annual).

[2] and [3] drop either BC or FA. [4] uses different period. They do not change the magnitude and the significance of the estimates so much. [6] (and [5]) used constrained FA which is equal to FA when it is lower than the mean (or 0) of FA, and equal to the mean (or 0) otherwise. The idea behind the estimation is that FA is effective only when the firms are ‘Constrained’, i.e., FA is low. Those modifications in FA do not change the result so much. [7] used KDI (capacity for production DI) discussed before instead of BC. It also does not change the coefficient of FA so much. The estimated coefficient of KDI is larger than the others because the variation of KDI is smaller (see Table 2). We also include the square of BC, FA and the product of FA and BC^{xxx_i} , none of them turn out to be significant. [8] estimates the equation (5) using aggregate data. Although the estimation gives the significant estimated coefficients for both BC and FA, the magnitude of those coefficients are smaller than those obtained when using panel data. [9] used instrumental variable method, since both FA and BC may be suffering endogeneity bias, i.e., they may be correlated with error term. We tried various instruments and give the result using one and two period lagged value of FA and BC. Both do not change the results.

Since specification [1] is robust to various perturbation, we use [1] in 5.3 to calculate the aggregate effect of each factor.

5.2 Test of the theory: Are more financially constrained industries less responsive to real shocks?^{xxxii}

Here we test the question above in the following manner. We create dummy variables, D_b (and D_g) which is equal to 1 when FA is smaller (larger) than the critical value FA^* (for example, -10), i.e., financially constrained, and is equal to 0 (1) otherwise. We estimate the same equation using both $D_b \cdot BC$ and $D_g \cdot BC$ instead of BC. By this we expect the coefficient of the former is smaller than the latter since industries are more likely to be financially constrained when D_b equals 1.

Table 3-b shows the results. [0] is replicated from [1] of Table 3-b. [1]-[5] are the results when FA^* is set 10, 0, -5, -10, -20, respectively. We can notice that the coefficient of BC at bad stage is always bigger than that of good stage, and as FA^* goes down the difference between the two coefficients gets larger. The difference is significant at 5% level when FA^* is -20. This finding is consistent with the theory in Section 2.

The last two rows of Table 3-b shows the number of observations at bad stage and the number of real estate industry out of them. We can find that the percentage of real estate climbs as the difference of the two coefficients gets larger, which imply the real estate industry, especially in the 1990's, are more heavily constrained by the upward sloping parts of the supply curve as in Figure 1-b.

5.3 Aggregate effect and comparison with other empirical studies

Ogawa and Kitasaka (2000) estimate the equation similar to (4)', i.e., regress I/K on marginal q series (real factor) they construct and bank lending (presumably financial factor), by small/medium/large and manufacture/non-manufacture firms separately. They find bank lending is significant for small firms in both manufacture and non-manufacture while it is not for large manufacture firms, which is predicted in Section 2 of this paper. They report that the effect of the shrink of bank lending in 1992-1993 on aggregate investment is 16.1% (93Q1) and in 1997-1998 it is 9.3% (98Q1) (both in deviation from actual aggregate investment: maximum effect in each case) by setting bank lending row at the same rate as previous three years.

Yoshikawa and Motonishi (1999) estimated the equation (5) using the data by small/large and manufacture/non-manufacture separately (four equations). They show FA is significant and larger for small firms than large firms. They simulate by setting FA in 96Q2-98Q2 to be the mean of the period 95Q2-96Q2 and conclude that the growth rate of investment dropped about 10% in 1998 due to FA^{xxxiii}.

In order to compare our result (we use basic estimation result [1] below) with those studies, we do the similar simulation. We set FA and BC during two recessions (92-94, 98-99) to be the mean of the whole sample period when they go below the mean. For example, the mean of FA(total) for the whole sample period is 14. In 1992-1994, FA (total) went below 14 beginning in the 2nd quarter of 1990 and recover 14 in the 3rd quarter of 1994. For within 18 period, FA (total) was below 14. We fix FA (total) for these 18 periods to be 14 (= mean of FA(total)), generate new investment series, and

compare this with actual investment series. The difference is assumed to be caused by financial factors.

Figure 3 gives a graphical exposition of setting of simulations. FA-1,2 and BC-1,2 are simulation names for FA and BC respectively. FA-2 and BC-2 start at the same time (from 4th quarter of 1997) by happening. At this start point, the so-called banking crisis occurred.

Table 4 gives the results for each simulation. Left table shows the percentage deviation of new investment series from actual investment series in each simulation. For example, we can interpret the cell of FA-1 and 2nd quarter of 1994 (=5.8) that, under simulation FA-1, level of investment would have been 5.8% higher than the actual investment. Also right table shows the change in growth rate of investment due to the change in either FA or BC. We can interpret the cell of FA-1 and 1991 (=2.3) that the growth rate of investment under simulation FA is higher by 2.3% points than the actual growth rate of investment in 1991.

Deviation table shows that although all of the simulations have considerable effects on the level of investment, the effects of BC are higher in both cases. This reflects coefficient of BC is far larger than that of FA in the basic estimation [1].

Right table shows that BC is dominant in both periods also in growth terms. In the first period (1992-94), especially in 1993-94, BC contributes 7.1% annually while actual investment growth is -8.0% annually. In the second period, BC is enough to bring negative growth of investment to positive. FA also contributes but not dominantly as BC.

Comparison with Ogawa and Kitasaka (2000)

They report the financial effects are 16.1% (93Q1) and 9.3% (98Q1) in deviation. For the first period, since they assumed bank lending grows at the same rate as in 1987-1989 when the investment boom, we reset FA to be 33, which is the mean of those three years and obtain 11.4%(93Q1) in deviation, which is a bit smaller number than their result. Similarly for the second period, we fix FA to be 17 which is similarly computed and obtain 3.5%(98Q1), which is also smaller than their result.

These differences in results seem due to the difference of the variables used. They use lagged lending to capture the supply of loan (financial factor) while we use FA to capture the supply side behavior. Lagged lending could be affected by the real factor as well as the financial factor if the demand shocks are serially correlated. The comparison of the effects of real factor show that our real factor effect is a bit larger than theirs under the same condition^{xxxiv}, which imply that their lagged lending includes the real factor effect as well.

Comparison with Yoshikawa and Motonishi(1999)

They report that if FAs after 96Q3 are set to be the mean of the period 95Q2-96Q2, which is 19 in our case, the growth rate of investment for 1998 increases by 10%. If we do the same simulation by setting FA to be 19, we get 5.6% increase in 1998, that is smaller than their result.

Simple weighted average of coefficients of FA reported in their study is 0.0028 (quarterly rate) which is larger than our estimated coefficient 0.0018. Since they use time-series data, unlike our estimation of panel data, it is possible that their estimates are imprecise.

5.4 Causes, interaction and the relationship with monetary policy

Although our study as well as existing studies so far verifies the importance of the financial factors, there are several problems unanswered.

First, we have not yet clarified if the financial factor is really the ‘**cause**’ of those declines. It could be the case that at first some real shock occurs, which eventually causes the depress of financial variables that subsequently induce the decline of investment. In other words, we are not sure if we should give particular shock to FA as in previous analysis, since the decline of FA may be caused by the real shock.

Second, closely related to the first point, we have not incorporate the ‘financial accelerator’ effect, that is, the **interaction** between the financial factor and real factor. More specifically, if there is a positive shock in the financial factors, this works to increase GDP through investment, which enhance the prospect of business condition (BC), which again increase GDP through investment and so forth. We may have underestimated the financial factor effect by neglecting this interaction in the previous analysis.

Third, the role of the **policy variable** was unclear in the previous analysis. Although it is difficult to perform well specified policy analysis, at least we would like to make sure if the cause of the problem is related to some policy variable, especially monetary policy.

To deal with these problems, we try the following analyses. First, we construct a simple VAR (Vector auto-regression) model which includes FA (total) and BC (total) in order to analyze the interaction using impulse response function. VAR can also be used to check if there were shocks to FA and BC during declines. Second, we regress the

change in FA (total) on the change in call rate which is thought to be an indicator of Japanese monetary policy, to relate the financial factor to monetary policy.

VAR analysis

Building a rigorous general equilibrium model is a difficult task and far beyond the scope of this paper. As a preliminary analysis, we construct a simple three variable (BC, FA and growth rate of real GDP) VAR model and use the impulse response function to compute the response of BC and FA to the initial shock of FA and BC. Figure 4 shows the impulse response functions^{xxxv}. Notice that BC responds positively to the shock of FA, although FA react negatively to the shock of BC. The positive response of BC to FA shocks can be viewed as ‘financial accelerator effect’^{xxxvi}. Therefore under those interactions the effect of FA is larger than the previous analysis while that of BC is smaller. We will actually calculate this interaction or financial accelerator effect later. Figure 5 is the residuals of FA and BC equation in VAR analysis, i.e., unpredicted movements of FA and BC by their (contemporary and) lagged variables. Hence we can think of them as independent shocks to FA and BC. It is interesting to note that we have two significant negative shocks in FA, 90Q4(-9) and 98Q1(-18).

Monetary Policy and FA analysis

In order to relate the movement of FA to monetary shock, we regress the change of FA to the change in call rate. Figure 6 gives the movements of official discount rate, call rate and FA. We can easily make sure a contemporary or lagged relationship between both interest rates and FA. Therefore we regress the change in FA on the contemporary and lagged change in call rate^{xxxvii}. Figure 7 shows the estimation results as well as the actual and predicted change using the first column’s result. It generally shows that much

of the fluctuation of FA can be explained by the change of call rate, and 1% point increase in call rate induces a 4 to 6 points increase in FA. Also the figure shows that while the negative shock of FA in 1990-91 can be largely explained by monetary policy, the huge negative shock in 1998 is totally unexplained by the movement of call rate and this size of unexplained negative shock is historically an irregular event.

5.5 Aggregate effect again

Using the information obtained in the previous subsection, we recalculate the aggregate effect of the financial factors, taking the interaction of the variables into account. More specifically we simulate two situations: what would have happened to investment (1) if call rate was not raised during 1990-1991, and (2) if there was no credit crunch induced by banking crisis, i.e., no large negative shock in FA in 1998? We proceed in the following manner. First, some plausible initial shocks which correspond to two situations are given to FA. Those shocks are translated to the change of FA and BC in the following periods through impulse response functions estimated in the previous subsection. Using those series of shocks in FA and BC, similar calculation about aggregate effect is done. Notice that here, unlike in subsection 5.3, effect of BC originated by the initial shock of FA is considered to be financial factor effect.

We use the following initial shocks. For the first situation (call this FA-1'), FA is increased by 10 points in the 4th quarter of 1990 and also 5 points in the 1st quarter of 1991. We choose those periods and magnitude because (a) VAR residual analysis indicates negative shocks in FA in those period (-9.0(90Q4), -4.6(91Q1)), (b) Monetary policy and FA analysis shows that gradual 4% increase in call rate (see Figure 6) during

1989-1990 has negative shock on FA about 20 point (cumulatively). For the second situation (call this FA-2'), FA is increased by 10 points in the 4th quarter of 1997 and 20 points in the 1st quarter of 1998 because (a)VAR analysis implies negative shock in this period (-16(98Q1)) which corresponds credit crunch induced by banking crisis, (b) Monetary Policy and FA analysis shows FA declined by 30 points unrelated to monetary policy during the period. We can make sure the plausibility of the assumption about initial shocks by Figure 8, where FA-1',2' and corresponding BC's are drawn.

Table 5 gives the results. Column named 'General' and 'Partial' stand for the effect with and without the change of BC. In other words, 'General' incorporates the interaction, i.e., financial accelerator effect while 'Partial' not. A comparison between them may highlight the importance of the interaction. In FA-1', in deviation 'General' effect is more than twice of 'Partial' effect at its peak. In the growth term, 'General' effect is 4% in 1991-92 while 'Partial' effect is less than 2%. Although this 'General' effect is large, the financial factor is still not a dominating factor in this period. In FA-2', 'General' effect is also twice of 'Partial' effect in deviation. In the growth table, 'General' effect is overwhelmingly large, averaged 10% during 1998-99. These correspond to the increase of GDP growth of 1.5%(1998) and 1.6%(1999) where actual GDP growth rate was -2.5%(1998) and 0.3%(1999). Of course they do not include so-called multiplier effects which is beyond the scope of this paper. However, comparison with the contribution of public investment to GDP growth, which is 1.2%(1993, see Table 1) at the maximum during 1990's makes us clear that those magnitudes are significantly large.

6. Conclusion

This paper tries to answer the question: how important are the financial factors in two declines of corporate investment in 1990's in Japan? We find:

- (1) in 1992-1994 the financial factor, specifically an increase in call rate during 1989-91, partly contributed to the decline of investment especially indirectly through the real factor, but it was not a dominant factor, and
- (2) in 1998-1999 credit crunch which is induced by so-called banking crisis played a significant role in the decline of investment directly and indirectly. Eliminating this shock leads the corporate investment to positive growth from negative 7-8% growth, and
- (3) incorporating interaction between financial factors and real factors (financial accelerator effect) greatly increases the estimate of financial factor effect. In other words, considering only direct effect may lead to significant underestimate of financial factor effect.

Looking ahead Figure 9 reports recent movements^{xxxviii} of DI's used in this analysis. All of them seem to be moving toward desirable direction though the levels still does not reach to the 1996-97 standard. It does not necessarily guarantee the recovery of corporate investment, but it seems highly likely so.

Finally we point out some drawbacks of this analysis. First, we neglect the fact that many large firms have been changing the route of finance from through bank or indirect financial intermediary to through direct capital market^{xxxix}. For example, according to Packer (1999), from 1996 to 1998 the issuance of corporate bonds increased more than 46% from 30.8 trillion yen to about 45 trillion yen. At the same period, loans from

Japan's banking sector decreased about 17 trillion yen (in 1999 total loan amounts to 489 trillion yen). This structural change works to soften the effect of credit crunch effect. Second, we could not differentiate between small and large firm's investment behavior. As in the analysis by Yoshikawa and Motonishi (1999) and Ogawa and Kitasaka (2000), their investment may be affected by financial factor differently. Since we could not obtain investment data by industry and by size, our estimation treat both size of firms in a same way. Hence the estimated coefficient of FA is thought to be weighted average of various size of firms. Third, we neglect various factors which affect cost of capital such as tax policy and price of capital goods. As Hasset and Hubbard (1997) shows, tax policy may have significant effect on investment and actually Japanese tax policy has changed through our estimation period.

Appendix I

Investment/Capital Stock :

Source: The Capital stock statistics of private corporations by Economic Planning Agency. Can be obtained in www.epa.go.jp (in Japanese)

Diffusion Index :

Source: The Short-term Economic Survey of Enterprises in Japan (Tankan), Bank of Japan). Can be obtained in www.boj.or.jp

(quotation from the survey) The Survey is conducted to provide an accurate picture of business trends of enterprises in Japan. The survey is conducted quarterly in March, June, September, and December (February, May, August and November from 1957 to 1996). For the following items, responding enterprises are asked to choose one alternative among three as the best descriptor of prevailing conditions, excluding seasonal factors at the time of the survey and three months hence.

[Number of sample enterprises (as of March 2000)]

	Manufacturing	Nonmanufacturing	Total (Response rate)
All Enterprises	3,879	5,326	9,205 (95.3%)
of which Large enterprises	775	652	1,427 (97.1%)
Medium-sized enterprises	1,110	1,802	2,912 (95.7%)
Small enterprises	1,994	2,872	4,866 (94.5%)

Business conditions: Judgement of general business conditions, primarily in light of the individual current profits.

[1)Favorable. 2)Not so favorable. 3)Unfavorable.]

Production capacity: Judgement of the excessiveness, adequacy, or shortage of production capacity, excluding a shortage caused by temporary conditions such as the closure of a factory for repairs.

[1)Excessive capacity. 2)Adequate. 3)Insufficient capacity.]

Lending attitude of financial institutions: Judgement of financial institutions' attitude towards lending as perceived by the responding enterprise.

[1)Accommodative. 2)Not so severe. 3)Severe.]

Appendix II

Here we derive the condition which ensures the specification (5), that is, BC and FA are linear in the investment capital ratio. (This appendix partly follows Yoshikawa and Motonishi(1999)).

First suppose the capital market is perfect.(Recall Figure 1-a.) Let x be the variable representing the extent of business condition. Assume that firms are uniformly distributed along x and let $au(t)$ and $al(t)$ be the upper bound and lower bound of the density of x , and define $a(t) = au(t) - al(t)$. ($a(t)$ is the width of the density and t denotes time.) Let $c(t)$ be the point on x such that firms with x over the point answer 'Favorable' about their future business condition. Similarly define the point under which firms answer 'Unfavorable' but normalize the point to be zero. Hence firms between zero and $c(t)$ answer 'Not so favorable'. Therefore our diffusion index BC is

$$BC_t = \frac{1}{a_t} [(au_t - c_t) - (-al_t)] = \frac{1}{a_t} [2 * \bar{x}_t - c_t] \text{---(A.1)}$$

where

$$\bar{x}_t = E_t(x)$$

$$\left(\frac{I}{K} \right)_i = \mathbf{a} + \mathbf{b} * x_i \text{---(A.2)}$$

Assume firms follow the following investment rule:

Letting $F(\cdot)$ be the distribution of x , aggregate investment can be expressed as

$$\left(\frac{I}{K} \right) = \int_{al}^{au} \left(\frac{K_i}{K} \right) * \left(\frac{I}{K} \right)_i(y) dF(y) = \int_{al}^{au} \left(\frac{K_i}{K} \right) * (\mathbf{a} + \mathbf{b} * y) dF(y)$$

Assuming $F(\cdot)$ is independent of K_i , and using (A.1)

$$\left(\frac{I}{K} \right) = \int_{al}^{au} (\mathbf{a} + \mathbf{b} * y) dF(y) = \mathbf{a} + \mathbf{b} \bar{x} = \mathbf{a} + \frac{\mathbf{b} * c_t}{2} + \frac{\mathbf{b} * a_t * BC}{2}$$

Further assuming a (width of density) and c (ratio of indifferent) is fixed over time, we obtain the expression of (5) under perfect capital market(without FA).

$$\left(\frac{I}{K} \right) = \hat{\mathbf{a}} + \hat{\mathbf{b}} * BC \text{---(A.3)}$$

Note that we are not restricting the support to move as economic situation changes.

Next we take FA into consideration. (Recall Figure 1-b). In order for FA to be in linear form as in equation (5),

$$\frac{d(I/K)}{dFA}$$

must be constant for all level of FA. Since (I/K) is the weighted average of (I/K) of unconstrained firms and constrained firms, and unconstrained firms do not respond to the shock in FA ($d(I/K)/dFA=0$ for unconstrained firms), we only need to be constant for all FA. Here $W(\cdot)$ denotes the ratio of constrained firm. Since $W(\cdot)$ is the decreasing in FA, the first term must be increasing function

of FA to keep the constancy. (Second derivative is positive.) In Figure 1-b, this requires the slope of the supply curve is steeper the less the financial factor

$$\frac{d(I/K)_{Constrained}}{dFA} * W(FA)$$

is severe. This is clearly counterintuitive. To fix this problem, we need to discard the assumption of linearity of FA and introduce higher order of FA. Despite this finding we use linear form for FA as a base case since it gives easy interpretation of coefficient. We try the quadratic form FA as an extension.

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Footnotes

ⁱ Stock price (Nikkei 225) tripled from December 1985 to December 1989. Similarly the price index for commercial land in six metropolitan cities tripled between March 1986 and August 1990. Stock price declined by 60% between 1990 and August 1992. Land prices also declined by half from 1991 to 1995. See chapter 5 of Cargill, Hutchinson and Ito(1997).

ⁱⁱ One of the main reason for the sudden recovery is fiscal stimulus in 1995. See Posen(1998).

ⁱⁱⁱ Kiyotaki and West(1996) is in this line. They claim that the investment behavior in the late 80's and early 90's can be mainly explained by shocks in optimal capital stock and cost of capital alone.

^{iv} During 1985-90, corporate investment has grown by 10.4% annually.

^v Without the assumption of homogenous capital goods, marginal q which represents investment opportunity may be different from average q which is related to the excessiveness of capital stock.

^{vi} See Mishkin(1998).

^{vii} Roughly speaking, the internationally active banks are required 8% capital ratio.

^{viii} See Woo(1999) and Ito and Sasaki(2000) for example.

^{ix} For the precise explanation of financial system shock at this period, see Hayakawa and Maeda(2000). For chronology see appendix II of Sekine(1999).

^x See Kiyotaki and Moore(1997) and Bernanke et. al.(1998) for this type of dynamic model.

^{xi} Average Q is calculated as firm's market value over replacement cost of the firm's capital stock.

^{xii} See Hubbard(1998) for details.

^{xiii} Ito and Sasaki(2000) show the importance of moral hazard behavior of failing banks. That is, the more non-performing loan does banks have, the more risky loan they will make (so-called evergreen effect). Therefore financial variable of banks could have both positive and negative effect on lending. We believe that this evergreen effect is limited to operating funds, not funds for investment because the investment of construction and real estate, which are dubbed as the evergreened industry in Ito and Sasaki(2000), declined more than any other industry (Figure 2-b). Hence we use the term "lending" as the lending for investment funds, not operating funds so that financial variable of banks are assumed to have only positive(the worse bank, lend less) effect on investment.

^{xiv} We will mention the analysis using aggregate data by Yoshikawa and Motonishi(1999) and Ogawa and Kitasaka(2000) in detail below.

^{xv} For example, Fazzari, Hubbard and Perterson(1988) use dividend payment ratio as a criterion. Hoshi, Kashyap and Scharfstein(1991) use Japanese firm data grouping the firm if the firm belongs to *Keiretsu*, industrial group. This a priori grouping is the one of the criticism against those literature. Hu and Snhiantarelli(1998) used Regime-Switching model instead of a priori grouping criteria.

^{xvi} Hayashi(1997) use different data set and conclude that the result obtained in the Hoshi et.al.(1991) is due to poor quality of the data.

^{xvii} See also Gibson(1995) for similar analysis.

^{xviii} Ogawa and Kitasaka(1999) using Japanese data concluded that signal from stock market were contaminated by noise unrelated to the fundamental profitability of the invesemnt project.

^{xix} This problem is noted by most of the literature. For example, Hoshi et.al.(1991) noted this point and show that the difference of coefficients between two group is significantly large, under the assumption that the grouping variable and Q are not systematically correlated.

Gilchrist and Himmelberg(1995) argues, however, that this assumption is probably violated because Q of constrained (newer and smaller) firms has less information than that of unconstrained(older and larger) firms, vice versa for cash flow. This makes the coefficient of cash flow for constrained firm larger than that for unconstrained firms even if both groups of firms are not financially constrained. They mitigate the problem using 'fundamental' Q and cash flow estimated by VAR.

Kaplan and Zingales(1997) criticizes the approach showing that the more financially constrained the group is, the less responsive to cash flow, by their grouping. They also argues that there is no theoretical reason to believe the monotonic increase in sensitivity to cash flow as constraint gets more strict.

^{xx} Yoshikawa and Motonishi(1999) reports that in 1990Q1 the investment share of the large/small(L/S) and manufacture/non-manufacture firm(M/NM) are 16%(L&M), 10%(L&NM), 22%(S&M) and 52%(S&NM) using the definition that the firm with capital over one billion yen is large firm.

^{xxi} The approach which use the specification (4)' or (4)'' to estimate each effect itself is also problematic in the sense that we are estimating the degree of capital market imperfection using the model whose null hypothesis is perfect capital market. In other words, we do not know how the variable which represent financing constrained enters the investment equation. See Chirinko(1997) for the structural approach.

^{xxii} The period in which whole data are available is from 74Q3 to 99Q3. Since we want to avoid the bias because of economic condition, we choose 76Q1 as a starting point. (According to EPA, the trough lies in 75Q1 and the peak in 77Q1.)

^{xxiii} These DI's are different from commonly used DI's for 'Principal Enterprises'. Since our purpose is to explain aggregate investment, we use DI's for 'All enterprises' which covers all sizes of firms. The former is the subset of the latter.

^{xxiv} Telecommunication & Transportation and Public Utility does not appear in the figure for brevity although they are used in the estimation. Agricultural, mining and finance & insurance industry is excluded from the estimation because they are not included in BOJ survey. Relative sizes of investment of each industry are 6%,0.2% and 4%. Therefore our estimation covers about 90% of aggregate investment.

^{xxv} They use the method proposed by Abel and Blanchard(1986). They first construct profit rate and discount factor series. Then they used VAR model to forecast future series of them and construct marginal q.

^{xxvi} Real estate should have different FA series for some reasons. First, their own balance sheet effect moves differently under the decline of land price. Second, Ministry of Finance restrict the bank lending to real estate starting in April 1990. This is effective measure, hence huge decline of real estate's FA can be explained by this measure. See chapter 5 of Cargil, Hutchison and Ito(1997).

^{xxvii} Discount rate has been increased up to 9% and decreased in April 1975 to 8.5%. Also it went up to 9% and decreased in August 1980 to 8.25%. We will investigate the relationship later.

^{xxviii} Discount rate was decreased July 1991 from 6% to 5.5%. Also land price begin to fall in late 1991.

^{xxix} We performed Breusch and Pagan test and reject null hypothesis of no random effect. Then we employ Hausman specification test and concluded random effect specification is misspecified. Therefore we employ fixed effect estimation.

^{xxx} We test for serial correlation following Yoshikawa and Motonishi(1999). After obtaining the error term e , we regress e on first to l th lagged value of e . We could not reject the null hypothesis that none of the lagged e are significant in the usual significance level(no serial correlation) when l is set to be four.(till third lag, we reject the null.)

^{xxxi} Actually we used square of FA or BC plus 100 instead, so that they are always positive.

^{xxxii} We try various specification to see if different industry behave differently. We group industries into 1.construction plus real estate, 2.other industries, and estimate the same equation separately since the first group may be more financially constrained due to the fall of land price. We also try different grouping. None of them give us sensible results. Although real estate and construction suffer heavily in 90's, they enjoyed 80's and the response can be contaminated by whole those period.

Then we simply group all observation into 1.when FA is above certain value(unconstrained), 2. Otherwise(constrained), and estimate the same equation separately, hoping that coefficient of BC is bigger for group 1 than group 2, and opposite for the coefficient of FA. Again we could not get significant results. Therefore in this subsection we maintain this grouping and additionally assume the response to FA is same for both groups.

^{xxxiii} They also simulate the effect of FA in the decline of 1992-94 by setting FA to be zero. They show FA actually work 'against' the decline and concluded that financial factor is not significant for the decline.

^{xxxiv} For the first period, they get 27% as the real factor effect assuming that their averaged marginal q is equal to that of 1988-89. Under the FA of this period that is 24, we get 32%. They do not report the real factor effect for the second period.

^{xxxv} Four lags are chosen by AIC and Schwarz criterion. Consumption tax dummy in the 2nd quarter of 1989 and 1997 are included. Impulse response is computed using orthogonalized shock of magnitude 1. Choleski decomposition is used with the ordering growth of real GDP, BC and FA. This ordering does not significantly affect the results..

^{xxxvi} We do not any reason for he negative response of FA to BC.

^{xxxvii} We also add land price growth, which turns out to be insignificant.

^{xxxviii} Results as of March 2000 was published April 3rd.

^{xxxix} More fundamentally we are implicitly assuming that loans and bonds are not perfect substitutes.